

Appendix H - DICE Monitoring Interface Requirements

DICE PC RS232 Serial Communications Interface

The DICE has a RS232 standard IBM PC compatible serial communications port for the sole purpose of monitoring performance of the DICE thru a remote IBM type PC computer. The DICE has a DB25 or a DB9 rear panel mounted connector to support this interface. The pinout is in an RS232 DCE device format. The baud rate is selectable via dipswitches from 1.2K to 19.2K Baud on the rear panel adjacent to the DB9 connector.

<u>Parameter to be Reported</u>	<u>Indication or units</u>
1. DIM operating Frequency	Hertz
2. DIM Control loop stress	Hertz
3. Computer Address request	Enabled/Disabled
4. Request Interrupt Flag	Set/Reset
5. DIM Control Loop Flag	Lock/Search
6. DIM AFC Flag	Enabled/Disabled
7. DPCS Hi Power Amplifier Output Power	dbm
8. DPCS Exciter Output Power	dbm
9. DPCS Selected Operating Frequency	Hertz
10. DPCS Control loop stress	Hertz
11. DPCS Control loop Flag	Lock/Search
12. DPCS Pilot Channel Lock Flag	Lock/Search
13. DIM Carrier Present Flag	Present/No Signal
14. DPCS Receive IF Present Flag	Present/No Signal
15. Power Supply Voltages	Volts
16. Power Supply Fault Flags	Fault/Nominal

Appendix from DICE O & M manual

5.3.3.1 Monitor PC Interface

A remote computer may be used to monitor the status of the DICE unit. This allows the user to view the current state of key system components, check system frequencies, perform diagnostic tests, and download new code.

5.3.3.1.1 Monitor Port Setup

1. Connect the "Monitor Port" (J107) DB9 connector on the rear panel of the DICE unit to a free serial port on any 486 or better PC compatible computer using a standard serial cable.

2. Install the software into any directory on the PC. The following files should be included:

DICE.BAT	-	Executable batch file that retains the syntax for running the monitor program DL.EXE. This file may be customized to the computer and serial port used.
DL.EXE	-	Executable monitor program and code downloader.
DCC.ASM	-	Assembly code for the DCC module.
DCC.HEX	-	Hexadecimal assembled code for the DCC module.
TABLE32.INC	-	CRC32 table. "Include" file for the DCC.ASM code. Must be present for assembly of the DCC code.
FLASH.INC	-	EPROM programming routine. "Include" file for the DCC.ASM code. Must be present for assembly of the DCC code.

3. Start the monitor program using DICE.BAT. To customize DICE.BAT to a particular computer, open it with any text editor and modify the line with the following syntax:

```
DL <logfile> <hexfile> /# /B=#
<logfile>      Name of an output log file. Use 'nul' if no output file is desired.
<hexfile>      Absolute Intel Hex file used for code downloads. The default is *.HEX
                in the current directory.
/#             A number specifying the com port used.
/B=#           A number specifying the com port BAUD rate. This number is a divisor
                used to generate the serial clocks. 1=115200, 2=57600, 3=38400,
                4=28800, 6=19200, 8=14400, 12=9600, 48=2400, 96=1200. The default
                BAUD rate is 57600. If a true 8250 UART is detected, the BAUD rate
                is automatically set to 9600.
```

Example: DL NUL DCC.HEX /2 /B=1 to use com port 2 at 115200 with no output log file.

NOTE: The monitor may be operated from standard modem software, such as Procomm or Flashlink. To do this, configure the modem software to the same settings as the DCC monitor port, then enter a "chat mode". Commands may be issued here except for the <CTRL-5> used for downloading new code.

NOTE: The monitor program may be started either before turning on the DICE unit or while the DICE unit is currently operating.

4. To exit the monitor program, press the <Esc> key.

5.3.3.1.2 System Status and Alarm Notification

The DICE unit continually monitors key system components and will generate a warning if any of the required frequencies are missing, or if either the PILOT or INTERROGATE subsystems loose loop lock. These warnings will be sent to the monitor PC. The following is a list of warnings and their possible causes.

No NIST 1 Hz!	-	NIST 1 Hz not present. Check NIST connection.
No NIST 100 Hz	-	NIST 100 Hz not present. Check NIST connection.
No 5 MHz REF!	-	5 MHz station reference not present. Check 5 MHz connection. Insure the DPCS board is installed and seated properly.
No 5 MHz/40 MHz- PLT Loop Unlocked-		Loss of internal 40 MHz signal. Check 5 MHz connection. Loss of either the 401.85 MHz PILOT transmit signal or the 74.45 MHz PILOT receive signal. Check the PILOT TX connection on the transmitting unit and the S-BAND RX IF on the receiving unit.
INT Loop Unlocked-		Loss of either the INTERROGATE 74.9 MHz transmit signal or the 468.8 MHz receive signal. Check the S-BAND TX IF and the UHF RX connections.
No DAPS!	-	DAPS connection lost. Check DAPS connection.
Sync Overflow	-	INT Loop locked, but data has not synced with the NIST 100 Hz. No action necessary, wait for INT data lock (#60sec).
VSWR Overload-		The VSWR on the PILOT TX output exceeded 3:1 and has shut down the power amplifier. Check the VSWR on the transmit cable and press the VSWR Reset button to restart the power amplifier.
Goodbye	-	A low voltage on the +5V supply has initiated the processor shut-down. A manual reset on the DCC board is required to restart the processor. This message will always appear the moment the DICE unit is turned off.

5.3.3.1.3 Monitor PC Commands

The monitor PC may be used to test certain routines within the DCC code, monitor specific system variables, and modify the DDS frequencies for testing. These are initiated with the following lists of commands:

DIAGNOSTIC COMMANDS - These commands either monitor the current system status or modify the system operation in some way.

ADC - Reads the current state of the specified channel to the analog-to-digital converter and returns the 8 bit value in hex. Usage: ADC x where x is the selected channel 0-f. The channels are as follows:

- 0 - DIM Frequency error voltage
- 1 - PLT Frequency error voltage
- 2 - PLT output power
- 3 - PLT exciter power
- 4 - DIM IF Level pot setting
- 5 - PLT Output Level pot setting
- 8 - +5 Volt Supply level
- 9 - -12 Volt Supply level
- A - +12 Volt Supply level

6,7,B,C,D,E,F - Not used

BANNER	-	Tests the printing code by writing the startup banner to the monitor PC.
CNTR	-	Tests the counter using INT channel 3 frequency.
CONFIG	-	Outputs the settings of the Monitor Configuration DIP switches in hex.
INTDDS	-	Modifies the INT DDS frequency by an offset $\pm 0\text{ffff}$. Usage: INTDDS ffff
INTFREQ	-	Toggles between INT only and normal mode.
INTSWEEP	-	Sweeps the INT DDS ± 500 Hz at 10 Hz/sec over the specified range. Usage: INTSWEEP (HI,MID,LO,OFF) where HI offsets the center frequency +7500 Hz, MID centers the frequency around the current frequency, LO offsets the center frequency -7500 Hz, and OFF turns off the sweeps for both the INT and PLT and restores their original frequencies. This command is used to test the requirement that the DIM retain lock with a 10 Hz/sec frequency drift.
LAMP	-	Initiates a lamp test on the DICE front panel.
LED	-	Sets the state of the LEDs. Usage: LED ff where ff is hex value of the led control register.
MONBER	-	Toggles the continual printing of the BER to the monitor PC.
MONFREQ	-	Toggles a flag to write every result from the frequency counter to the monitor PC. Type again to toggle off.
PHASE	-	Reads the current setting of the phase shift.
PLTDDS	-	Modifies the PLT DDS frequency by an offset $\pm 0\text{ffff}$. Usage: PLTDDS ffff
PLTFREQ	-	Toggles between PLT only and normal mode.
PLTSWEEP	-	Sweeps the PLT DDS ± 500 Hz at 10 Hz/sec over the specified range. This commands test the requirement that the DPCS retain lock with a 10 Hz/sec frequency drift. See the INTSWEEP command for usage.
RAMTEST	-	Initiates a test of the 32K static ram. The results are printed immediately to the monitor PC.
REMOTE	-	This sets the remote status port to hex value 0-ff. Usage: REMOTE ff. The commands are as follows: 00 - Alarms off 01 - PLT unlocked 02 - INT unlocked 04 - Request interrupt enabled 08 - Spare line "ON" "ON" is a low impedance
RESET	-	Initiates a hardware reset of the DCC board. Warning! - Loops may unlock temporarily while the system re-initializes.
STATUS	-	Displays the current status of PLT and INT control loops, frequencies, and levels. Also measures the power supply voltages.
STOP	-	Stops the processor. Warning! Once the processor is stopped a manual hardware reset on the DCC board is required to restart.
TIMECODE-	-	Toggle ON/OFF. Outputs the raw binary data of the transmitted time code, every 30 seconds.
TXPRINT	-	Initiates a print test to the DICE front panel display.
UTILITY COMMANDS - These commands are other available utilities. These do not affect the system operation.		
BER	-	Calculates a BER from 0xffffffff and 0xffff. Usage: BER xxxxxxxx yyyy where x is the bit count and y is the error count.

B7WR - Writes the buffer contents from 0xff to 0B7ff. Usage: B7WR ff.

DIV - Divides a 32-bit decimal value by a 16-bit value. Usage: DIV xxxxxxxx yyyy where x is the 32-bit number to be divided by y, the 16-bit divisor.

DUMPBUF - Prints the contents of the external memory buffer starting at 0xffff. Usage: DUMPBUF ffff.

RESERVED COMMANDS - These commands are either for development only or are called by other routines. They should not be used independently.

BAUD - Sets the BAUD configuration register to 0xff. **Warning!** Setting the baud register may make the serial port unreadable. See the Monitor Config chart in the Theory of Operation section for baud and data settings. Usage: BAUD ff

DOWNLOAD- Puts the processor into the download mode in preparation to receive a new program. Normally this command is called automatically when the 'CTRL-5' download command is used. See the next section on 'Software Updates'.

RANDOM - Toggles the noise-reduction random delay in the main routine on and off.

5.3.3.1.4 Software Updates

Updates to the DCC code can be programmed into the flash memory through the monitor PC.

WARNING! The download routine is software driven. If new code corrupts this routine, the ability to download new code may be lost. If this happens, contact ATS about having the flash memory reprogrammed. Do the following steps to load new code into the flash memory.

1. Start the DL.EXE program using the name of the new hex file, or simply name the new code DCC.HEX and run DICE.BAT. NOTE: Code downloads will not work with standard modem software, the DL.EXE program must be used.
2. Initiate a hardware reset using the RESET command. This will clear the system status and verify the monitor is working properly.
3. Start the code download by pressing <CTRL-5> using the '5' on the keypad. The monitor will report the status of the download and will check to insure it was downloaded correctly. Then a hardware reset will be automatically initiated and the new program will start running.